

REMARKS

The Examiner is thanked for the interview of October 23, 2003. In the interview, the motivation to combine Nakajima and Sanada was discussed. The Applicant argued that there is no motivation to combine and thus the rejection should be withdrawn. The Examiner stated that it was obvious to apply the principles of Nakajima to Sanada since the function was similar and therefore the system of Nakajima could be used to inspect substrates as described in Sanada.

In the Office Action, the Examiner rejected claim 1-18, 20-41 and 44-45 under 35 USC 103. These rejections are fully traversed below.

The Examiner also allowed claims 25-28, 41, 44, 45, 47 and 53-59 and objected to claims 5, 8, 19 and 60.

Claims 21, 25 and 60 have been amended. Claim 61 has been added. Thus, claims 1-28, 35-41 and 44-61 are pending in the application. Reconsideration of the application is respectfully requested based on the following remarks.

ISSUES UNDER 35 USC 112(2)

Claim 21 has been rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection has been overcome by the amendment made above. In particular, the term “substrate” has been changed to “reticle, mask, or semiconductor wafer.” The same can be said for the amendments to claim 25.

ISSUES UNDER 35 USC 103(a)

Claim 23 has been rejected under 35 U.S.C. §103(a) as being unpatentable over *Karaki et al* (5,130,965).

In contrast to *Karaki*, claim 23 specifically requires, “...the diffraction grating being arranged for separating the light beam into a plurality of light beams which form scanning spots on the surface of the mask, reticle or semiconductor wafer...” While *Karaki* may disclose a diffraction grid 4 adapted to divide a parallel beam flux into a primary and diffraction beams that form spots S1, S2 and S3 on a recording medium 8, *Karaki* does not teach or suggest forming scanning spots, let alone scanning spots on the surface of a mask, reticle or semiconductor wafer. In *Karaki*, the spots do not scan, but rather follow tracks, T.

Also in contrast to *Karaki*, claim 23 specifically requires, “...each of the scanning spots having a specified overlap and separation with respect to one another that is controlled by the grating spacing and rotation of the diffraction grating about the optical axis...” While *Karaki* may disclose tilting or rotating the diffraction grid 4, *Karaki* does not teach or suggest anything about grating spacing. The Examiner is respectfully urged to make a showing of such a teaching in *Karaki* in order to maintain the rejection.

Furthermore, it is believed that the Examiner failed to establish a prima facie case of obviousness. There simply is no basis in the art for modifying *Karaki* to produce the claimed invention. In the outstanding office action, the Examiner asserted that it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use the

basic device of *Karaki* et al for inspecting the defects of a mask, reticle or wafer because the device would function in the same manner. This however is incorrect. The device of *Karaki*, which records and reproduces compact discs would simply not be capable of inspecting the defects of a mask, reticle or wafer. Recording and reproducing compact discs is a significantly different function than the inspecting masks, reticles or semiconductor wafers for defects.

To elaborate, just because the recording and reproduction device of *Karaki* tangentially includes optical and detection elements does not mean that the device would be capable of detecting defects related to masks, reticles or semiconductor wafers. The defects detected in *Karaki* are simply not the same as in the present invention. These defects are associated with recording defects that determine how well the pit is reproduced, i.e., whether or not a pit P has been properly recorded on a track. Recording defects such as these are simply not the same type of defects being referred to in the present invention. As stated in the background of the present invention on page 1, "The presence of defects on the surfaces of the photomasks is highly undesirable and adversely affects the resulting circuits. The defects can be due to, but not limited to, a portion of the pattern being absent from an area where it is intended to be present, a portion of the pattern being present in an area where it is not intended to be, chemical stains or residues from the photomask manufacturing processes which cause an unintended localized modification of the light transmission property of the photomask, particulate contaminates such as dust, resist flakes, skin flakes, erosion of the photolithographic pattern due to electrostatic discharge, artifacts in the photomask substrate such as pits, scratches, and striations, and localized light transmission errors in the substrate or pattern layer." *Karaki* simply does not function in the same manner as the present invention and therefore the rejection should be withdrawn.

The Examiner also asserted that that it would have been obvious to one having ordinary skill in the art at the time of the invention was made to control the space of the grating or the rotation angle of the grating so that the scanning spots having a specified overlap to ensure that the entire surface is scanned. This assertion, however, is incorrect. *Karaki* simply does not teach or suggest scanning let alone scanning the entire surface of the recording medium. In *Karaki*, the spots follow tracks, T. They do not scan over the surface of the recording medium. In fact, the spots S2 and S3 are included for the purpose of keeping the spot S1 on the track. *Karaki* states, "...the second beam B2 and the third beam B3 are serve only for monitoring the

status of the information track (Col. 2, lines 20-23).” *Karaki* simply does not scan the surface and therefore the rejection should be withdrawn.

Moreover, *Karaki* is completely silent to increasing the speed of inspection via a diffraction grid as in the present invention. Without this distinction there is no desirability to modify. As should be appreciated, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention would select the elements from the cited prior art references for combination or modification in the manner claimed.

In the present invention, a diffraction grating is used to separate a single light beam into multiple light beams so as to increase the speed of inspection. Each of the beams produces a scanning spot. The amount of light beams and therefore scanning spots produced generally corresponds to the desired inspection speed, i.e., the greater the number of light beams/scanning spots, the greater the inspection speed. By way of example, a single beam may be separated into three beams. By triplicating the beam, a wider scan is produced and therefore the resulting inspection speed is about three times faster than the speed produced for a non-triplicated single beam.

In *Karaki*, the light beams always follow tracks and each of the light beams serves a different function. *Karaki* has a primary beam for recording and reproducing and sub beams for tracking or determining recording quality. Because the beams serve different functions, they are not additive as can be achieved with the present invention. The beams of *Karaki* simply do not work together to increase the scanning rate as in the present invention. Accordingly, the rejection is unsupported by the art and should be withdrawn

Claims 1-4, 6-18, 20-22, 24, 35-40 and 48-52 have been rejected under 35 U.S.C. §103(a) as being unpatentable over *Nakajima et al* (5,576,825) in view of *Sanada et al* (6,084,716).

It is believed that the Examiner failed to establish a prima facie case of obviousness. There simply is no basis in the art for combining *Nakajima* and *Sanada* to produce the claimed invention. Neither reference teaches or suggests a reason why one of ordinary skill in the art would combine these two reference to come up with the claimed invention. As should be

appreciated, obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Monteffiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

In the outstanding office action, the Examiner incorrectly established a relationship between *Nakajima* and *Sanada* when he asserted that “*Nakajima* teaches that the device is also used for inspecting printed pattern on various kinds of sheet materials (Col. 9, lines 1-7) and does not explicitly teach that the substrate is a mask, reticle or semiconductor wafer; however such a feature is known in the art as taught by *Sanada*.” There simply is no relationship between the sheet materials of *Nakajima* and the substrates of *Sanada*. As best understood, the sheet materials of *Nakajima* are directed at sheets of paper such as bills and bank notes. This is a far cry from materials associated with semiconductor substrates such as masks, reticles or wafers as for example, silicon.

There is also no relationship between the printed patterns of *Nakajima* and the patterns printed on reticles, wafers and masks. As best understood, the printed patterns of *Nakajima* include characters, numerals, symbols, figures on the like. For example, in the case of a \$1 bill, the printed pattern may include numerals such as 1, characters such as “one dollar” and figures such as George Washington. In contrast, the patterns associated with semiconductor substrates typically include circuit patterns and the like. One skilled in the art of semiconductor substrates would simply not be motivated to use *Nakajima* to solve problems associated with semiconductor substrates. Accordingly, the rejection should be withdrawn.

The Examiner also asserted that *Nakajima* is from the same field of endeavor as *Sanada*. This too is incorrect. *Nakajima* is directed at an apparatus that determines the genuineness or kind of bill or coin. For example, it appears that the device of *Nakajima* could be used in a soda or candy machine to ensure that the inserted bill or coin is real rather than counterfeit or whether the inserted bill is a \$1 bill rather than a \$5 bill. In contrast, *Sanada* is directed at an inspection apparatus for inspecting masks, reticles or wafers having patterns requisite for fabricating semiconductor devices. For example, inspecting for defects that cause malfunction of semiconductor devices. Bills, bank notes and coins, are in completely different endeavor than semiconductor devices. Just because the device of *Nakajima* tangentially includes optical and detection elements does not mean that it is in the same field of endeavor as devices capable

of detecting defects related to masks, reticles or semiconductor wafers. Something related to bills or coins is simply not in the same field of endeavor as something related to semiconductor devices. The rejection should therefore be withdrawn.

Furthermore, the device of *Nakajima*, which detects patterns of bills and bank notes is not interchangeable with devices capable of detecting defects of a mask, reticle or wafer. These device serve two significantly different functions. By way of example, the materials (e.g., paper vs. silicon), the print process (ink vs. etch, deposit, photoresist), and the patterns (George Washington vs. circuits) are very different. The size of the patterns are also typically very different, i.e., the design rules for semiconductor devices are typically magnitudes smaller than that indicated in *Nakajima*. Simply put, one of ordinary skill in the art would not have been expected to look at a bill machine to obtain guidance as to how to solve problems associated with inspecting semiconductor related substrates.

ALLOWABLE SUBJECT MATTER

Claims 25-28, 41, 44, 45, 47 and 53-59 have been allowed. Claim 60 was amended to include the limitations of the independent base claim 24. Claim 61, which includes the limitations of independent claim 24, allowed claim 8 and intervening claim 7, was added. These claims should be allowed as the Examiner indicated allowable subject matter in the outstanding office action.

SUMMARY

Applicants believe that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,

BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read "Hoellwarth", with a stylized flourish at the end.

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